

2. STAFF, ORGANIZATION, AND FACILITIES

2.1 Staff

The diverse staff of the Laboratory for Atmospheres is made up of scientists, engineers, technicians, administrative assistants, and resource analysts, with a total staff of 228.

The civil servant composition of the Laboratory consists of 57 members; 50 are scientists, 2 are engineers, 3 administrative support, 1 a technical manager, and 1 a technician. Of the 52 civil servant scientists and engineers, 92% hold doctoral degrees.

An integral part of the Laboratory staff is composed of onsite research associates and contractors. The research associates are primarily members of joint centers involving the Earth Sciences Division and nearby university associations, e.g., the Joint Center for Earth Systems Technology (JCET), the Goddard Earth Sciences and Technology Center (GEST), and the Earth System Science Interdisciplinary Center (ESSIC), or are employed by universities with which the Laboratory has a collaborative relationship, such as George Mason University, University of Arizona, and Georgia Tech. Of the 76 research associates, 81% hold Ph.D.'s. The onsite contractors are a very important component of the staffing of the Laboratory. Out of the total of 89 onsite contractors, 20% hold Ph.D.s. The makeup of our Laboratory, therefore, is 28% civil servants, 33% associates, and 39% contractors.

The number of refereed publications (from 1992) and proposals (from 1997) written by Laboratory members is shown in Figure 2.1. The number in each category is shown above the bars. The difference between the red and blue bars gives the number of papers that our scientists co-authored with outside scientists and is one measure of our extensive collaboration. The yellow bars show the number of proposals written in recent years and indicate an increasing percentage as a function of papers written. The reduced number of refereed papers in 2004 and 2005 are due in part to the loss of the Atmospheric Experiment Branch, which is no longer part of our Laboratory, to reduction in civil service scientists from attrition, and to the implementation of full cost accounting, which necessitates increased time spent on proposal writing.

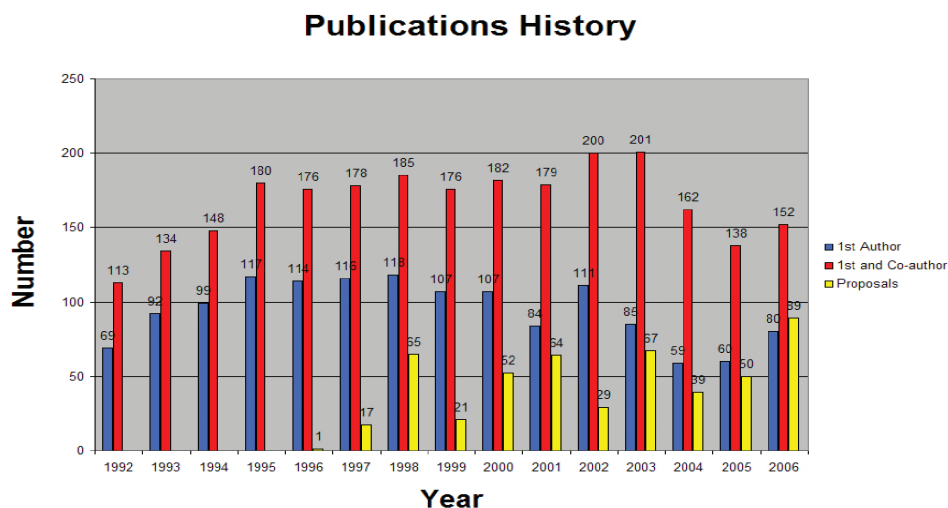


Figure 2.1. Number of proposals and refereed publications by Laboratory for Atmospheres members over the years. The red bar is the total number of publications where a Laboratory member is the first author or co-author, and the blue bar is the number of publications where a Laboratory member is first author. Proposals submitted are shown in yellow.

2.2 Organization

The management and branch structure for the Laboratory for Atmospheres at the end of 2006 is shown in Figure 2.2.

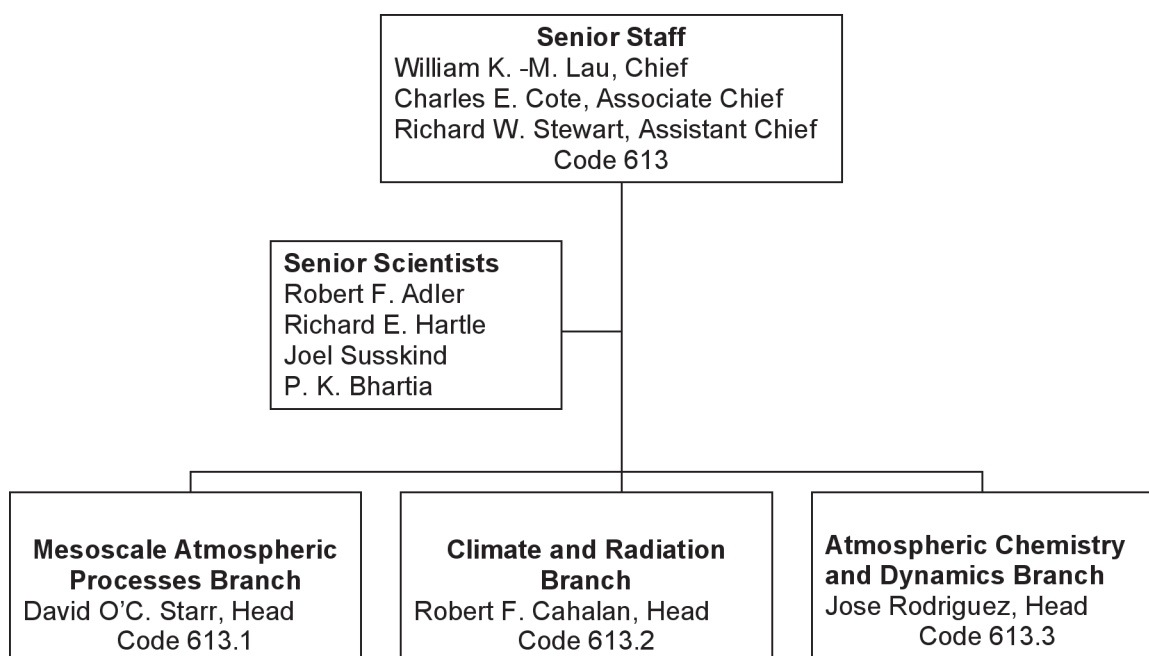


Figure 2.2. Laboratory for Atmospheres organization chart at the end of calendar year 2006.

2.3 Branch Descriptions

The Laboratory has traditionally been organized into branches; however, we work on science projects that are becoming more and more cross-disciplinary. Branch members collaborate with each other within their branch, across branches and laboratories, and across divisions within the Directorate. Some of the recent cross-disciplinary research themes of interest in the Laboratory are the Global Water and Energy Cycle, Carbon Cycle, Weather and Short-Term Climate Forecasting, Long-Term Climate Change, Atmospheric Chemistry, and Aerosols. The employment composition of the Senior Staff Office (613) and the three branches is broken down by Civil Servant, Associate, and Contractor as shown in Figure 2.3.

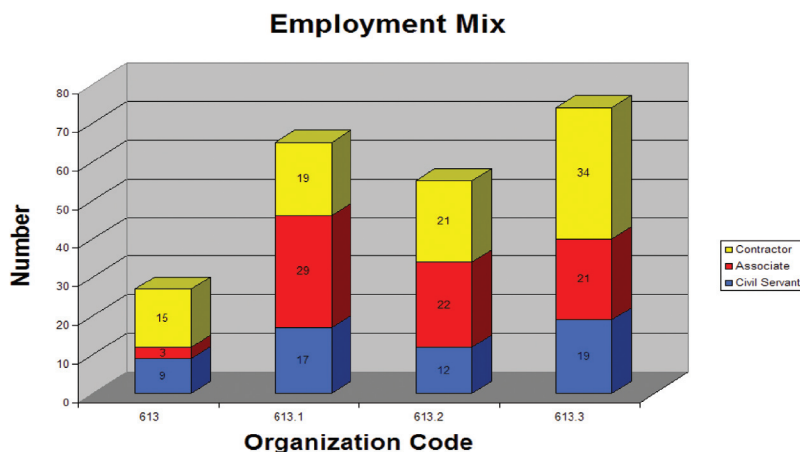


Figure 2.3. Employment composition of the members of the Laboratory for Atmospheres.

A brief description is given for each of the Laboratory's three branches. Later, in Section 5, the Branch Heads summarize the science goals and achievements of their branches. The branch summaries are supplemented by a selection of news items, publication lists, and samples of highlighted journal articles given in Appendices 1 through 3, respectively.

Mesoscale Atmospheric Processes Branch, Code 613.1

The mission of this Branch is to understand the physics and dynamics of atmospheric processes through the use of satellite, airborne, and surface-based remote sensing observations and model simulations. Development of advanced remote sensing instrumentation (primarily lidar and radar) and techniques to measure aerosols, clouds, water vapor and winds in the troposphere is an important focus. Key areas of investigation are cloud and precipitation systems (including aerosol/cloud interaction) and their environments, ranging from the scale of individual clouds and thunderstorms to mesoscale convective systems and cyclonic storms. The climate impacts at regional and global scales, e.g., El Niño Southern Oscillation (ENSO), are a major focus. State-of-the-art efforts involve coupling various NASA Goddard physical packages (microphysics, radiation, and land surface models) into a next generation weather forecast model (known as the weather and research forecast model or WRF), and implementing a mesoscale cloud-resolving model (Goddard Cumulus Ensemble Model) into a global model. In summary, the Branch focuses its research on all aspects of the atmospheric hydrologic cycle, its connections to the global energy cycle, and associated hazards, such as hurricanes, floods and landslides. The Branch plays a key science leadership role in satellite missions, such as the Tropical Rainfall Measurement Mission (TRMM) and the Geoscience Laser Altimeter System (GLAS) on ICESat. Similarly, we contribute to the formulation of new mission concepts, such as the Global Precipitation Mission (GPM). Participation in field campaigns such as the NASA African Monsoon Multidisciplinary Analysis (NAMMA), Costa Rica Aura Validation Experiment (CR-AVE), and the Calipso/CloudSat Validation Experiment (CC-VEx) continues to be a high priority. Further information about Branch activities may be found on the Web at <http://atmospheres.gsfc.nasa.gov/meso/>.

Climate and Radiation Branch, Code 613.2

The Climate and Radiation Branch has a threefold mission:

- (1) to understand, assess, and predict climate variability and change, including the impact of natural forcing and human activities on climate now and in the future;
- (2) to assess the impacts of climate variability and change on society; and
- (3) to consider strategies for adapting to, and mitigating, climate variability and change.

To address this mission, a wide range of scales is studied, from the spatial microscales of nucleation processes to the Sun–Earth distance, and from microsecond to geologic time scales. Research focus areas include observational and modeling studies of tropospheric aerosols, cloud processes, rainfall, solar radiation, and surface properties. Key disciplines are radiative transfer, both as a driver for climate studies and as a tool for the remote sensing of parameters of the Earth's climate system; climate theory and modeling over the full range of scales; and the development of new methods for the analysis of climate data. Ongoing projects in cooperation with other NASA centers, government agencies, and with university partners include development and assessment of observational climate data records, incorporation of microphysical cloud-aerosol interactions in climate models, addressing gaps in the current climate observing system, development and deployment of new instruments, and planning for future space-based and *in situ* missions. Further information about Branch activities may be found at <http://climate.gsfc.nasa.gov/>.

Atmospheric Chemistry and Dynamics Branch, Code 613.3

The Atmospheric Chemistry and Dynamics Branch conducts research on remote sensing of atmospheric trace gases and aerosols from satellite, aircraft, and ground, and develops computer-based models to understand

and predict the long-term evolution of the ozone layer, changes in global air quality caused by human activity, and the interaction between atmospheric composition and climate change. The Branch develops and maintains research quality, long-term data sets of ozone, aerosols, and surface ultraviolet (UV) radiation for assessment of the health of the ozone layer and its environmental impact. It continues its long history of providing science leadership for NASA's atmospheric chemistry satellites, such as the Total Ozone Mapping Spectrometer (TOMS) and Upper Atmosphere Research Satellite (UARS), and the recently launched Earth Observing System (EOS) Aura satellite, and works closely with the National Oceanic and Atmospheric Administration (NOAA) on ozone sensors on the operational weather satellites (NOAA-N), the National Polar Orbiting Environmental Satellite System (NPOESS), and the NPOESS Preparatory Project (NPP). The Aura satellite hosts four advanced atmospheric chemistry instruments designed to study the evolution of stratospheric ozone, climate, and air quality. Analysis of Aura data will be the central focus of the Branch activities in the coming years. Modeling activities in the branch will continue to focus on simulations for the analysis of Aura data, and assessment of the impact of anthropogenic activity on the atmospheric composition and climate. Further information on Branch activities may be found on the Web <http://atmospheres.gsfc.nasa.gov/acd/>.

Branch Web sites may also be found by clicking on the branch icons at the Laboratory home page <http://atmospheres.gsfc.nasa.gov/>.

2.4 Facilities

Computing Capabilities

Computing capabilities used by the Laboratory range from high-performance supercomputers to scientific workstations to desktop personal computers. Each Branch maintains its own system of computers, which are a combination of Windows, Linux, and Mac OS X computers. A major portion of scientific data analysis and manipulation, and image viewing is still done on Unix cluster machines with increasing amounts of data analysis and imaging done on single-user personal computers.

Lidar

The Laboratory has well-equipped facilities to develop lidar systems for airborne and ground-based measurements of clouds, aerosols, methane, ozone, water vapor, pressure, temperature, and winds. Lasers capable of generating radiation from 266 nm to beyond 1,000 nm are available, as is a range of sensitive photon detectors for use throughout this wavelength region. Details may be found in the Laboratory for Atmospheres Instrument Systems Report, NASA/TP-2005-212783 which is also available on the Laboratory's home page.

Radiometric Calibration and Development Facility

The Radiometric Calibration and Development Facility (RCDF) supports the calibration and development of instruments for ground- and space-based observations for atmospheric composition including gases and aerosols. As part of the EOS calibration program, the RCDF provides calibrations for all national and international ultraviolet and visible (UV/VIS) spaceborne solar backscatter instruments, which include the Solar Backscatter Ultraviolet/Version 2 (SBUV/2) and TOMS instruments, and the European backscatter instruments flying on the Environmental Satellite (EnviSat) and Aura. The RCDF also provides laboratory resources for developing and testing of advanced spaceborne instruments being developed in the Laboratory for Atmospheres. In addition, ground-based sky-viewing instruments used for research and validation measurements of chemistry missions, such as Envisat and Aura, are also supported in the RCDF. The facility maintains state-of-the-art instrument radiometric test equipment and has a close relationship with the National Institute of Standards and Technology (NIST) for maintaining radiometric standards. For further information contact Scott Janz, Scott.J.Janz@nasa.gov.